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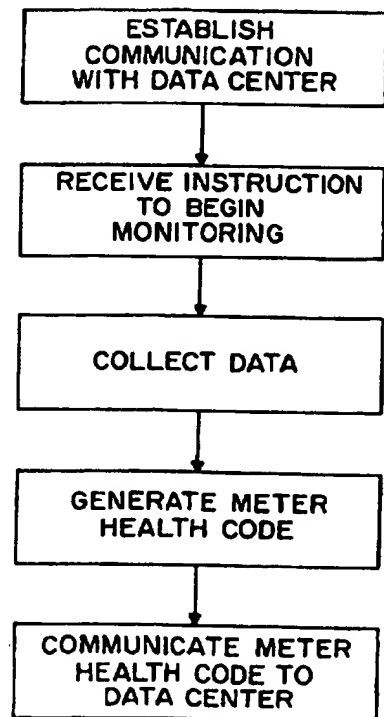
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With international search report.

(54) Title: SYSTEM FOR PROVIDING EARLY WARNING PREEMPTIVE POSTAL EQUIPMENT REPLACEMENT

(57) Abstract

An improved system for providing early warning preemptive postal equipment replacement. Selected performance parameters of the postal equipment are monitored and compared against predetermined operational boundaries. The system is capable of providing for variability in the performance parameters, wherein these parameters may be permitted to vary over time and usage of the equipment. The monitoring gives an indication of the overall system performance. If the system performance goes outside of operational boundaries, or changes significantly over time, replacement of the equipment can then be scheduled with minimal inconvenience to the customer.



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SYSTEM FOR PROVIDING EARLY WARNING PREEMPTIVE
POSTAL EQUIPMENT REPLACEMENT

RELATED APPLICATIONS

This application claims priority from pending
5 U.S. Provisional Application Serial No. 60/015,526, filed
on April 23, 1996, and a pending U.S. Provisional
Application entitled "Proof of Postage Digital Franking
System," Attorney Docket No. ASCOP043US, filed on April
9, 1997, for which a Serial No. has yet to be assigned,
10 both of which are hereby incorporated by reference.

TECHNICAL FIELD

The present invention relates generally to
predicting when a device is likely to fail, and in
particular to such prediction in postal equipment, such
15 as postage meters, also called franking machines.

BACKGROUND ART

In countries such as the United States, the
postal authority does not permit a customer to actually
own a postage meter. Rather, the postal customer rents
20 the postage meter from a manufacturer approved by the
postal authority, such as the assignee of the present
application. This meter is then used at the postal
customer's facility.

In the United States, the postal customer
25 traditionally adds postage to the meter in two ways. The
first is to physically take the meter to the postal
authority where postage is purchased and added to the
meter. The second is to remotely add postage over the
telephone line with a modem wherein the added postage is

deducted from an account maintained with the meter's manufacturer.

While postal equipment in general, and postage meters in particular, are designed to be extremely reliable, on occasion a customer's meter has been known to fail. Generally speaking, there are two types of failures, catastrophic and non-catastrophic. The non-catastrophic is by far the most common of the two, and occurs when some component of the postage meter ceases to operate, such as the display, a mechanical linkage, etc. A catastrophic failure occurs when some or all of the information stored in nonvolatile memory is not recoverable, as discussed below.

The consequence of a non-catastrophic meter failure is primarily one of customer inconvenience. When such a failure occurs, the customer no longer has use of the equipment and must call for technical support. A field repair or replacement must then be scheduled, which further lengthens the "down time" of the equipment for the customer. In the case of a metering device, the failed device needs to be removed from service, the postal authority notified, and a replacement unit logged with the postal authority, and then finally provided to the customer. Depending on what component failed, certain information contained in the failed meter may be transferred to the replacement meter by the service technician.

In an electronic postage meter the amount of postage available for printing (or printed) is stored in a nonvolatile memory. It may be desirable to store the accounting data redundantly, as set forth in PCT pub. no. WO 89-11134, which is incorporated herein by reference. In addition, it may be desirable that the redundant

memories be of differing technologies, as set forth in the aforementioned PCT publication. Finally, it is extremely desirable to protect the memory from harm due to processor malfunction, as set forth in US pat. no. 5,276,844, in EP pub. no. 527010, or in EP pub. no. 737944, each of which is incorporated herein by reference.

The user of an electronic postage meter should not be able to affect the stored postage data in any way other than reducing it (by printing postage) or increasing it (by authorized resetting activities). Some single stored location must necessarily be relied upon by all parties (the customer, the postal authority, and the provider of the meter) as the sole determinant of the value of the amount of postage available for printing. In electronic postage meters, the single stored location is the secure physical housing of the meter itself. Within the secure housing, one or more items of data in one or more nonvolatile memories serve to determine the amount of postage available for printing.

While a catastrophic failure is rare, the consequences of a catastrophic failure are far more severe, namely loss by the user of postage value for which the postal authority has already been paid. Furthermore, it is possible that in a catastrophic failure no information contained in the failed meter may be transferred to the replacement meter by the service technician. Thus, there is also the loss of historical data which may be of value to the customer.

30

DISCLOSURE OF INVENTION

In accordance with the present invention, there is provided a greatly improved system providing early

warning preemptive postal equipment replacement.
According to the invention, it is provided that selected performance parameters of the postal equipment are monitored and compared against predetermined operational
5 boundaries. The monitoring gives an indication of the overall system performance. If the system performance goes outside of operational boundaries, or changes significantly, replacement can be scheduled with minimal inconvenience to the customer. Data from the old meter
10 can then be orderly transferred to the replacement meter.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a block diagram of the system of the present invention used with a postage meter.

Fig. 2 is a flow chart of the method for
15 providing early warning according to the invention.

Fig. 3 is a flow chart of the method for providing early warning according to another embodiment of the invention.

MODES FOR CARRYING OUT THE INVENTION

20 Referring to Fig. 1, a system in accordance with the invention is shown generally at 10, and includes a line or communications link 12 for communicating with a Data Center (not shown) used in remote resetting of postage meters having a communication device such as a
25 telephone 14 therein, a Central Processing Unit (CPU) 16, non-volatile memory 18, read only memory (ROM) 20, random access memory (RAM) 22, input means 24, display means 26, and print means 28. The CPU 16 is connected to a Data Center through communications link or line 12. Processor
30 16, read only memory 18, random access memory 22, input

means 24, display means 26, and print means are coupled with each other by system bus 30.

Referring now to Fig. 2, a flow chart is shown wherein the deviation of system parameters is determined in connection with remote resetting of the meter. Generally, the meter communicates with a Data Center maintained by the meter manufacturer, which in turn communicates with a bank or other holder of funds. If funds sufficient to cover the requested amount of postage are on deposit, then that amount of postage is added to the meter. Systems for the resetting of meters remotely through the use of Data Center are known in the art. Telemeter setting (TMS) may be carried out as set forth in EPO pub. no. EP 442761, or as set forth in PCT pub. no. WO 86-05611, each of which is incorporated herein by reference.

Once communication has been established between processor 16 and the Data Center, the processor 16 is instructed to monitor certain preselected system parameters, such as motor acceleration and speed, solenoid actuation time, sensor switching time, internal diagnostic history, spare CPU band pass, non-volatile memory useable address locations remaining, display element integrity, value setting time, cycles printed, etc. The motor and solenoid are typically contained in print means 28.

Processor 16 then algorithmically represents the data on the preselected system parameters through a "Metering Health Code" (MHC), which periodically (for the purposes of determining the time periods between MHC generations) summarizes the performance level of the system and remains resident in the metering system, for example in non volatile memory 18. The present invention

includes the capability of providing for variability in the performance measuring parameters wherein said performance monitoring parameters may be made to vary over time (e.g., aging) and usage such that it is possible and desirable to accept the performance of an older(er) product/device and yet not accept the same performance when attributed to a new product/device. The "Meter Health Code" can be stored in the postage meter and compared against predetermined parameters by the Data Center, or as preferred employment, the Data Center would also maintain a history of the postage meter's health codes and have the ability to evaluate each postage meter against its own health code degradation. In this manner, a postage meter which is degrading very slowly can be left in service longer than a postage meter that shows a more rapid degradation pattern. Another preferred embodiment of this invention is to execute a benchmark evaluation of the postage meter at the time of manufacture, said benchmark would reside within the postage meter memory as well as within the Data Center's history file applied to that specific postage meter.

The "Metering Health Code" is then communicated to the Data Center where it is evaluated to determine if the meter is a candidate for replacement. Such evaluation need not occur during the communication with the meter, but may occur at another time. Alternatively, such evaluation may occur within the meter itself, with the result of the evaluation being transmitted to the Data Center.

Rather than generate the "Meter Health Code" in the meter, and communicate the result to the Data Center for evaluation, alternatively the parameters underlying the "Metering Health Code" may be communicated to the

Data Center and the "Metering Health Code" will be determined and evaluated at the Data Center.

Evaluation of the "Meter Health Code" assures the system is performing within acceptable boundaries at the time the "Meter Health Code" is determined. Furthermore, monitoring changes system performance over time is beneficial. Even if overall system performance at a given point in time is within acceptable boundaries, a change in the "Metering Health Code" would signal a need to monitor the system closely or to perform preventative maintenance, or in the case of a meter, replace it prior to a failure resulting in "down time" for the customer.

With an early warning of impending failure, a replacement can be scheduled with no inconvenience to the customer. The physical exchange could be made during a period of non-use by the customer. Furthermore, the customer's accounting and historical system information maintained within the customer's meter can be reconfigured into the new meter via modem at the time the new meter is "logged" into the Data Center. For example, said customer-use specific accounting and historical data (from the customer's existing meter) would be uploaded to the Data Center prior to meter replacement. When the new meter "logs" on with the Data Center, said customer data is downloaded into the replacement meter. The customer is now able to continue system usage without any of his customer-specific data having been changed.

Referring now to Fig. 3, a flow chart is shown wherein the generation of "Meter Health Code" occurs in response to an input from other than the Data Center during funds recharging. In this embodiment of the invention, the process of the present invention is

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commenced in response to the appropriate command given during a routine inspection via the modem or keyboard/display by entering a code which extracts and transmits the quantitative performance data to the Data
5 Center or displays/prints the quantitative performance data to the user.

While there have been described what are believed to be the preferred embodiments of the invention, those skilled in the art will recognize that
10 other and further modifications may be made thereto without departing from the invention and it is intended to claim all such changes and modifications as fully within the scope of the invention.

I CLAIM:

1. A system for providing early warning preemptive postal equipment replacement, comprising:

5 means for communicating with a Data Center;

processor means for monitoring selected system parameters responsive to a communication from said Data Center;

10 means for summarizing said selected system parameters to reflect the performance level of the system;

means for communicating said summarized performance level of the system to said Data Center.

2. The system as described in Claim 1,
15 wherein said means for communicating with a Data Center is a modem.

3. The system as described in Claim 1,
wherein said means for communicating with a Data Center is a global communications network.

20 4. A system for providing early warning preemptive postal equipment replacement, comprising:

means for communicating with a Data Center;

25 processor means for monitoring selected system parameters responsive to a communication from said Data Center;

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means for summarizing said selected system parameters to reflect the performance level of the system;

5 means for communicating said summarized performance level of the system to said Data Center;

means for evaluating said summarized performance level of the system to determine if replacement of the postal equipment is warranted.

10 5. The system as described in Claim 4, wherein said means for communicating with a Data Center is a modem.

6. The system as described in Claim 4, wherein said means for communicating with a Data Center is a global communications network.

15 7. A system for providing early warning preemptive postal equipment replacement, comprising:

processor means for monitoring selected system parameters;

20 means for summarizing said selected system parameters to reflect the performance level of the system;

means for communicating said summarized performance level of the system to a user of the system.

25 8. The system as described in Claim 7, wherein said means for communicating said summarized performance level of the system to a user of the system

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is a liquid crystal display or other technology capable of visually presenting computer derived information.

9. A system for providing early warning preemptive postal equipment replacement, comprising:

5 processor means for monitoring selected system parameters on a periodic basis;

means for summarizing said selected system parameters to reflect the performance level of the system;

10 memory means for storing said summarized performance level of the system.

10. A method for providing early warning preemptive postal equipment replacement, comprising:

communicating with a Data Center;

15 monitoring selected system parameters responsive to a communication from said Data Center;

summarizing said selected system parameters to reflect the performance level of the system;

20 communicating said summarized performance level of the system to said Data Center;

evaluating said summarized performance level of the system to determine if replacement of the postal equipment is warranted.

25 11. A method for providing early warning preemptive postal equipment replacement, comprising:

monitoring selected system parameters;

summarizing said selected system parameters to reflect the performance level of the system;

5 evaluating said summarized performance level of the system to determine if replacement of the postal equipment is warranted.

12. A method for providing early warning preemptive postal equipment replacement, comprising:

10 monitoring selected system parameters;

summarizing said selected system parameters to reflect the performance level of the system;

15 communicating said summarized performance level of the system to a user of the system.

13. A method for providing early warning preemptive postal equipment replacement, comprising:

monitoring selected system parameters;

20 summarizing said selected system parameters to reflect the performance level of the system;

storing said summarized performance level of the system.

14. The method as described in Claim 13,
25 wherein said monitoring is performed periodically.

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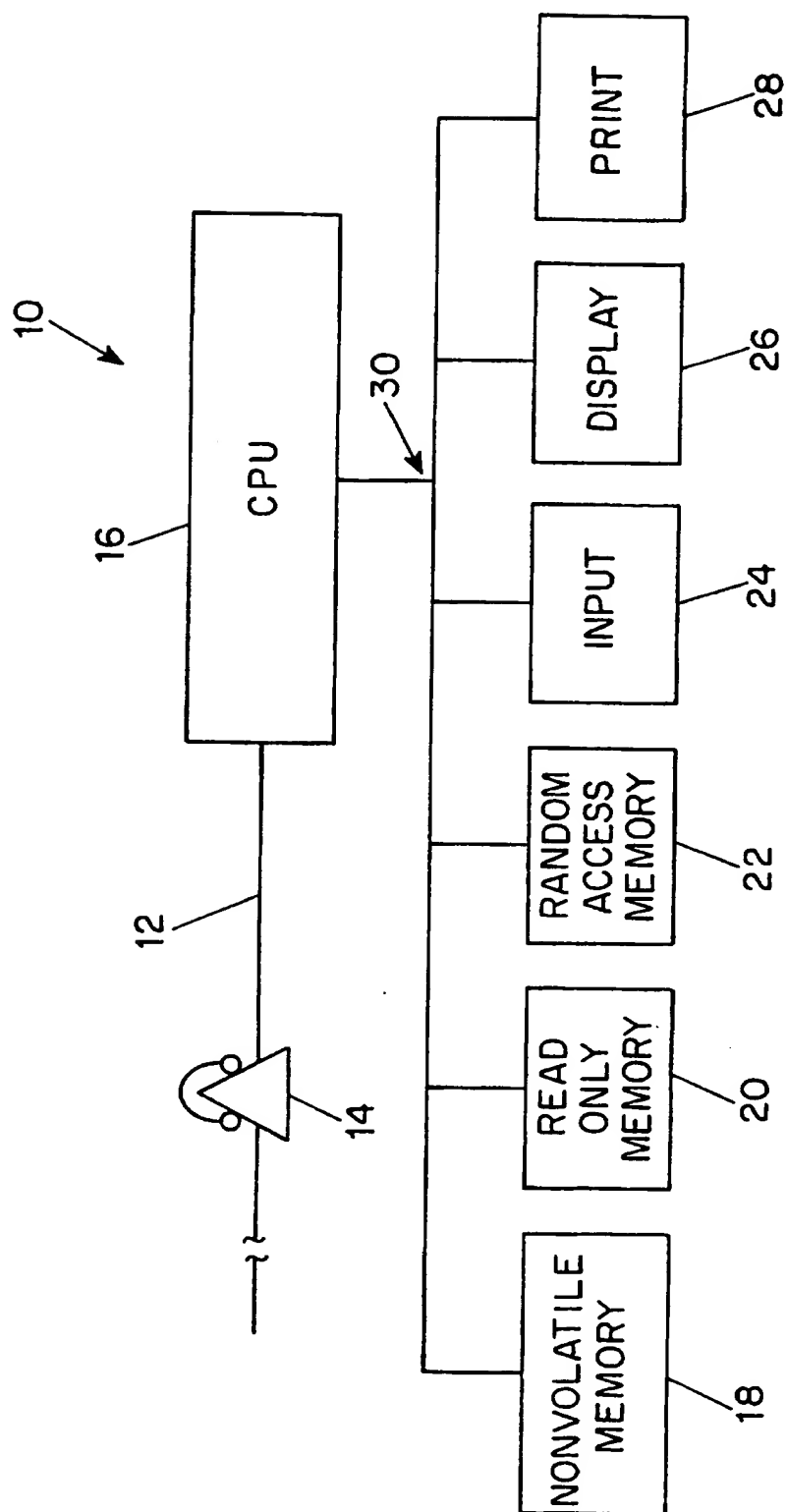


FIG. 1

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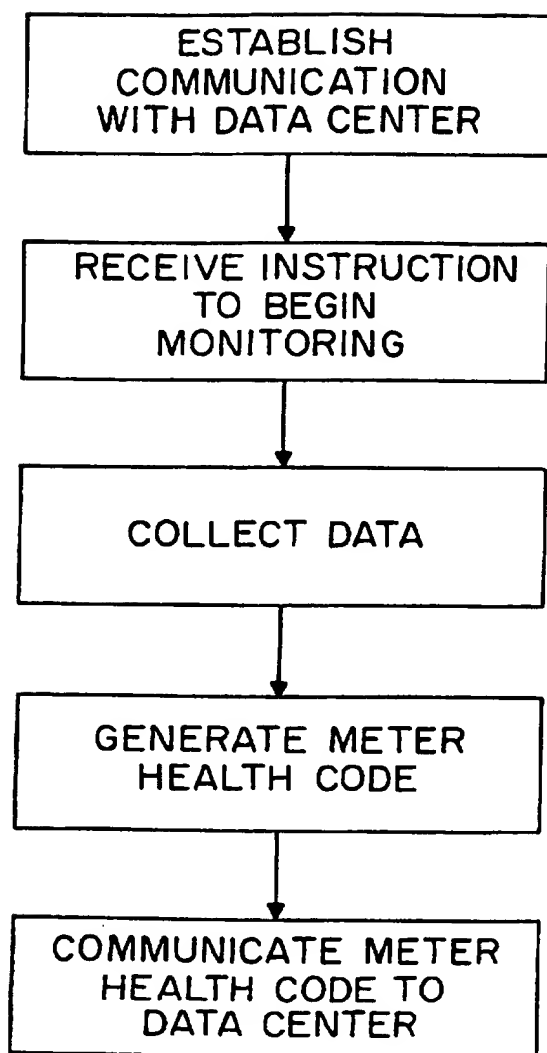


FIG. 2

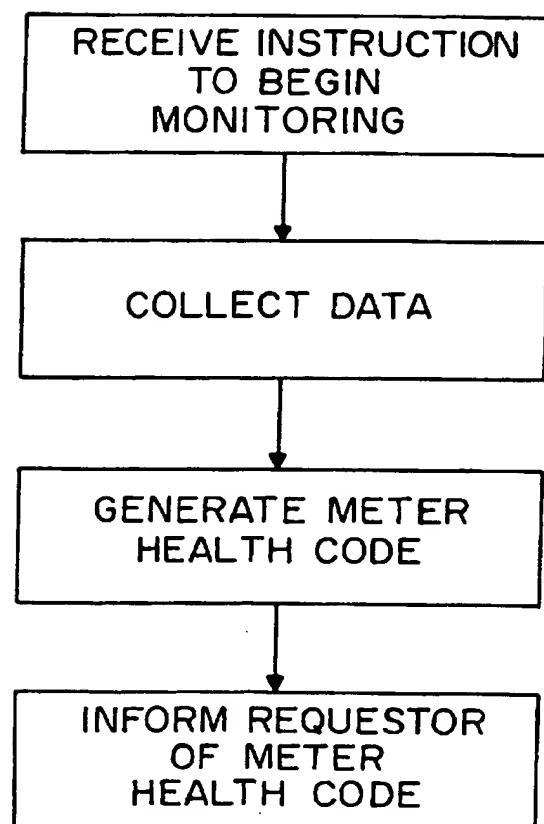


FIG. 3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US97/06837

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) : G08B 21/00; H04M 11/04; G07B 17/00

US CL : 364/551.01; 340/514, 679, 825.55; 364/464.2; 379/49, 90

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 364/551.01; 340/514, 679, 825.55; 364/464.2; 379/49, 90

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
NONE.Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
NONE.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|-----------|--|-----------------------|
| A | A, US, 4,234,926 (WALLACE et al) 18 November 1980, see abstract. | 1, 2, 4, 5, 7 & 9-14 |
| A | A, US, 5,008,827 (SANSONE et al) 16 April 1991, see abstract. | 1, 2, 4, 5, 7 & 9-14 |
| A | A, US, 5,043,908 (MANDULEY et al) 27 August 1991, see abstract. | 1, 2, 4, 5, 7 & 9-14 |
| A | A, US, 5,063,857 (KISSEL, JR.) 12 November 1991, see abstract. | 1, 2, 4, 5, 7 & 9-14 |
| A | A, US, 5,276,844 (AEBI et al) 04 January 1994, see abstract. | 1, 2, 4, 5, 7 & 9-14 |

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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Date of the actual completion of the international search
26 JUNE 1997Date of mailing of the international search report
31 JUL 1997Name and mailing address of the ISA/US
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Form PCT/ISA/210 (second sheet)(July 1992)*

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US97/06837

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☒ Claims Nos.: 3, 6 & 8
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

Claims 3, 6 & 8 are directed to subject matter which is not supported by the disclosure.

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

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1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
☐ No protest accompanied the payment of additional search fees.

Form PCT/ISA/210 (continuation of first sheet(1))(July 1992)*